Madigan, D. J., & Nicholls, A. R. (in press). Mental toughness and burnout in junior athletes: A longitudinal investigation. *Psychology of Sport and Exercise.*

Mental Toughness and Burnout in Junior Athletes:

A Longitudinal Investigation

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Abstract

Objectives: Mental toughness correlated negatively with burnout in several cross-sectional studies. It is unclear, however, whether mental toughness predicts changes in athlete burnout over time.

Design: Two-wave longitudinal design.

Method: We examined mental toughness and burnout in 93 junior athletes (mean age 17.7 years) across a three-month period of active training.

Results: Regression analyses revealed that mental toughness predicted residual decreases in total burnout, reduced sense of accomplishment, physical and emotional exhaustion, and devaluation over time.

Conclusion: As such, mental toughness may offer athletes protection from the experience of burnout symptoms in sport.

Keywords: mentally tough; athlete burnout; longitudinal study; junior athletes

Introduction

Athlete burnout is a multifaceted syndrome comprising three symptoms: a reduced sense of accomplishment, physical and emotional exhaustion (consecutively referred to as exhaustion), and sports devaluation (Raedeke & Smith, 2001). The intense training required for optimal performance and competitive sport itself can leave athletes susceptible to the negative outcomes of burnout. These include reduced well-being, performance, and ultimately sport dropout (Goodger, Gorely, Lavallee, & Harwood, 2007). Consequently, sport scientists attempted to determine personal factors that may provide protection from these negative consequences. One personal factor found to protect athletes from the negative consequences of burnout is mental toughness (Gucciardi & Gordon, 2009).

Mental Toughness and Athlete Burnout

Gucciardi, Hanton, Gordon, Mallett, and Temby (2015) recently conceptualized mental toughness as a unidimensional personal characteristic, which represents the psychological capacity to deliver high performance on a regular basis despite varying situational demands. As such, mental toughness acts as an organizing framework for personal resources, which are central to coping with internal and external stressors (Gucciardi et al., 2015). These authors suggested that mental toughness is important for performance, goal progress, and thriving under stressful conditions.

Burnout is theorized to be the product of chronic stress (Smith, 1986), so personal factors associated with stress are thought to be important in the development of burnout. For example, there is evidence that certain characteristics will make athletes more susceptible to the experience of stress in sport (e.g., trait anxiety, neuroticism, trait negative affect; DeFreese & Smith, 2014; Goodger et al., 2007). Mental toughness however is the antithesis of these constructs – making athletes less susceptible to stress in sport – and, therefore, may be a protective factor. Mental

toughness may interact with the stress process in two ways. Firstly, it could influence primary appraisals. That is, mentally tough athletes would be more likely to appraise stressful situations as a challenge rather than a threat, in comparison with their less mentally tough counterparts (Levy, Nicholls, & Polman, 2012). Secondly, mental toughness may also impact upon secondary appraisal (i.e., the process in which a person decides which coping strategy to deploy and how effective it would be). Indeed, Kaiseler, Polman, and Nicholls (2009) reported that the most mentally tough athletes deployed the most effective coping strategies, inferring a more efficient secondary appraisal process. As such, mental toughness may offer protection from the chronic accrual of stress, which is theorized to be the key factor in the development of burnout.

There is empirical evidence to support the protective effect of mental toughness in the burnout process. For example, Gucciardi and Gordon (2009) found that mental toughness exhibited a negative cross-sectional association with burnout among a sample of cricketers. However, cross-sectional data reveals little about the temporal and possible causal associations between mental toughness and burnout. As such, longitudinal studies are required. Only one study, however, has investigated this relationship over time, and this was not in a sporting context. Gerber and colleagues (2015) found the expected cross-sectional associations between mental toughness and burnout. They also found a small-to-moderate effect of mental toughness predicting residual decreases in burnout ($\beta = -.23$, $p = .07$). This was nonsignificant at conventional levels of significance. Moreover, it is not clear how Gerber's et al.'s (2015) findings, which contained students, would relate to athletic populations. This is because athletes have to contend with a variety of different life (e.g., dietary, health, and sleep) and sport stressors (e.g., need for additional rest, unexplained aches, and performance concerns) during training and competition (e.g., Nicholls, Jones, Polman, & Borkoles, 2009). In addition, the distinction between the sport and school domains is important because burnout is conceptualized differently

(e.g., Raedeke & Smith, 2001; Salmela-Aro, Kiuru, Leskinen, & Nurmi, 2009). Therefore, research that longitudinally explores the relationship between mental toughness and burnout is warranted.

Mental toughness may be relatively more important in the burnout process than other similar characteristics (e.g., grit or resilience). This is for a number of reasons. Firstly, grit is associated with a long-term focus on a singular objective, whereas mental toughness may be salient for multiple (and potentially conflicting) objectives. As such, mental toughness may provide greater protection from the varying situational demands (and stress) that occur in sport. Secondly, rather than being a personal factor, resilience relates to dynamic systems (e.g., organizations). Moreover, resilience represents the outcomes of efforts to enact or mobilize resources (i.e., coping) when confronted with stress (Compas, Connor-Smith, Salztman, Harding Thomsen, & Wadsworth, 2001), whereas mental toughness is both reactive and proactive. Therefore, mental toughness may provide greater protection from stressors of varying intensity, duration, and frequency (see Gucciardi, 2017).

The Present Study

In order to address the aforementioned gaps in the mental toughness and burnout literature, we longitudinally examined the relationship between mental toughness and burnout among junior athletes over a three-month period of active training. In line with theory (e.g., Gucciardi et al., 2015) and previous research (e.g., Gucciardi & Gordon, 2009), we conducted this study with the following hypotheses:

Hypothesis 1: We expected a negative cross-sectional association between mental toughness and burnout.

Hypothesis 2: We expected mental toughness to predict residual decreases in athlete burnout over time.

Method

Participants

We recruited a sample of 102 athletes (74 male, 28 female) from the south of England to participate in the present study. Participants' mean age was 17.7 years (*SD* = 0.7; range = 16 to 20 years). Participants were involved in a range of sports (soccer *n* = 40, rugby *n* = 27, basketball *n* = 16, athletics *n* = 12, or other sports *n* = 7) and trained on average 10.2 hours per week (*SD* = 4.2). All Participants competed at a similar sports academy level. Sports academies are part of the United Kingdom's further education system. They aim to recruit and develop promising junior athletes. As such, they provide a talent pathway for progression to the elite level.

Procedure

A university Ethics Committee approved this study. We obtained informed consent from all participants, in addition to obtaining parental consent from participants' parents when the athletes were aged 17 years and under. We distributed questionnaires during training in the presence of the first author. Participants received measures of mental toughness and burnout at Time 1 and then the measure of athlete burnout three months later (Time 2). The three-month interval between Time 1 and Time 2 was considered sufficient because previous research has shown that this time interval allows researchers to capture changes in athlete burnout during periods of active training (e.g., Cresswell & Eklund, 2005; Madigan, Stoeber, & Passfield, 2016).

Measures

Mental Toughness. The Mental Toughness Index (MTI; Gucciardi et al., 2015) measured mental toughness. The MTI is an 8-item scale and includes the following questions: "I believe in my ability to achieve my goals" and "I consistently overcome adversity." The MTI was contextualized to ensure participants responded to items regarding their sport. Participants were asked to indicate how true each statement was in their sport responding on a scale from 1 (*false,*

100% of the time) to 7 (*true, 100% of the time*). Gucciardi et al. (2015) and Mahoney, Ntoumanis, Gucciardi, Mallett, and Stebbings (2016) found that the MTI is a reliable and valid measure of mental toughness among athletes.

Athlete Burnout. The Athlete Burnout Questionnaire (ABQ; Raedeke & Smith, 2001) measured burnout. The ABQ comprises three 5-item subscales capturing the key symptoms of athlete burnout: reduced sense of accomplishment (e.g., "I am not achieving much in my sport"), exhaustion ("I am exhausted by the mental and physical demands of my sport"), and devaluation ("I'm not into my sport like I used to be"). Moreover, the subscales were also combined to create a total score of athlete burnout (e.g., Madigan, Stoeber, & Passfield, 2015). The ABQ is the most widely-used measure of athlete burnout and has demonstrated reliability and validity in numerous studies (e.g. Cresswell & Eklund, 2005). Participants were asked how often they experienced the symptoms described in the statements responding on a scale from 1 (*almost never*) to 5 (*almost always*).

Data Screening

Because only 15 item responses were missing, we replaced the missing responses with the mean of the item responses of the corresponding scale (ipsatized item replacement; Graham, Cumsille, & Elek-Fisk, 2003). Next, Cronbach's alphas were computed for the variables (see Table 1) which were all satisfactory (alphas > .70). Following recommendations by Tabachnick and Fidell (2007), data were screened for multivariate outliers. Two participants showed a Mahalanobis distance larger than the critical value of $\chi^2(9) = 27.88$, $p < .001$, and were excluded from further analyses. Then, a Box's *M* test was conducted to examine if the variance–covariance matrices showed any differences between gender (Tabachnick & Fidell, 2007). The test was nonsignificant with $F < 1.97$, $p > .56$, so all further analyses were collapsed across gender. Finally, because seven participants did not complete the measures on both occasions, the final

longitudinal sample size was $N = 93$ (68 male, 25 female).

Analytic Strategy

To examine the relationships between mental toughness and burnout, we examined the bivariate correlations between all variables. We then conducted a series of multiple regression analyses. These analyses investigated the longitudinal relationship between mental toughness and burnout, predicting residual changes in burnout over time. Burnout from Time 1 was entered at Step 1, to control for baseline levels of burnout. Mental toughness was then entered at Step 2. This analysis was repeated for total burnout and the three individual symptoms of burnout.

Results

Bivariate Correlations

The bivariate correlations between all variables are shown in Table 1. As in previous research (e.g., Madigan et al., 2015), the dimensions of burnout showed a significant positive correlation with each other between and within time points. Furthermore, mental toughness showed significant negative correlations with total burnout and all burnout symptoms across both Time 1 and Time 2.

Multiple Regression Analyses

The findings of the multiple regression analyses are shown in Table 2. Results showed that mental toughness predicted residual decreases in total burnout and all burnout symptoms over time. The models explained between 46-67% of the variance in burnout at Time 2 (see again Table 2).[1]

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[1]To control for demographic variables (age, sex, and training load), we ran additional bivariate correlations between these variable and burnout at Time 2. No variable showed a significant correlation. To control for the overlap between demographic variables, we ran

Discussion

In this study, we longitudinally examined the relationship between mental toughness and burnout among athletes. Expanding on previous studies that revealed a negative cross-sectional association between mental toughness and burnout (e.g., Gucciardi & Gordon, 2009), mental toughness predicted residual decreases in total burnout, reduced sense of accomplishment, physical and emotional exhaustion, and devaluation over time.

The findings of the present study supported both of our hypotheses. In support of Hypothesis 1, our findings revealed that mental toughness showed a significant negative cross-sectional association with burnout. This was in line with previous cross-sectional research (e.g., Gucciardi & Gordon, 2009). Aligned to Hypothesis 2, our findings demonstrated that mental toughness predicted residual decreases in burnout over time. Whereas this is the first study to show this relationship among athletes, the size of this effect was in line with previous longitudinal work in the school domain (Gerber et al., 2015). Moreover, the findings add to the evidence that personal factors are important in the development of burnout (e.g., perfectionism; Madigan et al., 2015, see also Gustafsson, Madigan, & Lundkvist, in press). Finally, our understanding of mental toughness and burnout could be advanced if scholars examine whether mental toughness interacts with important interpersonal factors associated with the longitudinal development of burnout (e.g., negative social interactions; DeFreese & Smith, 2014).

There is evidence that mental toughness and negative outcomes in sport are associated with one another (e.g., increased risk of distress; Tibbert, Andersen, & Morris, 2015). However, the present findings add to the expanding literature by suggesting that mental toughness is an

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additional regression analyses with these variables entered in Step 1. As expected from the results of the correlation analyses, all demographic variables emerged as nonsignificant predictors.

important characteristic offering athletes protection from negative psychological health outcomes (Gucciardi et al., 2015). This said, future longitudinal studies are necessary to determine if the protective effect found in the present study replicates for other important outcomes in sport (e.g., overtraining syndrome; Meeusen et al., 2013).

We adopted a unidimensional model of mental toughness but accept that a number of multidimensional models of mental toughness are in existence. It is not clear, however, what additional insight a multidimensional conceptualisation of mental toughness would offer in relation to burnout. For example, previous research adopting a multidimensional approach found that all dimensions shared similar negative associations with burnout (e.g., Gucciardi & Gordon, 2009). Future research could adopt different models of mental toughness to investigate if differing conceptualizations influence the results. However, with 10 separate definitions of mental toughness existing in the literature (see Gucciardi, 2017), it may be more beneficial for future research to focus on the overlap between existing definitions.

The present study did not include any mediators, that is, variables that could explain the protective effect of mental toughness on burnout. One such factor may be coping. For example, athletes high in mental toughness may have coped better with the stress associated with sport. Research suggests that athletes high in mental toughness adopt more problem-focused coping and less avoidant coping (i.e., Nicholls, Polman, Levy, & Backhouse, 2008), as these strategies have been differentially associated with burnout symptoms (i.e., Hill, Hall, & Appleton, 2010), coping may serve to explain this protective effect. Future longitudinal studies could therefore include such variables in mediation models of the mental toughness-athlete burnout relationship (Cole & Maxwell, 2003). Finally, scholars could investigate if athlete stress plays a mediating and/or a moderating role in the relationship between mental toughness and burnout (cf. Raedeke & Smith, 2004).

Limitations and Future Research

The present study has a number of limitations. First, we assessed burnout at the beginning and end of the three-month period, but measured mental toughness only at the beginning. Future research interested in developmental changes in mental toughness should therefore include measures of both variables at both time points. This would allow for a test of reciprocal effects of burnout predicting changes in mental toughness. Second, the present study investigated the relationship between mental toughness and burnout over a short time period (i.e., 3 months), whereas previous research has shown that a 3-month period is sufficient to detect changes in burnout (e.g., Cresswell & Eklund, 2005), future studies are required to determine if the protective effect found in the present study persists over longer time periods (e.g., over an entire season or even a number of years). Third, we did not control for participants' engagement in competition during the study period. As competition can be a stressful experience, future research should include a measure of competition engagement to determine if it affects the mental toughness-burnout relationship. Finally, we recommend that future research interested in the role of training load in the burnout process include measures of both internal (e.g., heart rate) and external load (e.g., distance covered) to ensure an accurate quantification of the load experienced by athletes (see e.g., Halson, 2014).

Currently, the prevalence of burnout in athletes is difficult to ascertain. The main reason for this is that sport-specific diagnostic cut-offs do not currently exist. Future research is therefore required to explore the underlying structure of scores from the Athlete Burnout Questionnaire to determine if categories (i.e., cut-offs) can be differentiated. To this end, taxometric analysis techniques may be particularly useful (see Gustafsson, DeFreese, & Madigan, 2017). This may be particularly useful in helping determine if mental toughness can help prevent or reduce clinical levels of burnout.

Conclusion

The present study enhances our understanding of the mental toughness-athlete burnout relationship, being the first study to show that mental toughness predicts residual decreases in athlete burnout over time. The findings provide further evidence that mental toughness is a personal factor providing athletes with protection from the experience of burnout symptoms in sport.

References

Cole, D. A., & Maxwell, S. E. (2003). Testing mediational models with longitudinal data: Questions and tips in the use of structural equation modeling. *Journal of Abnormal Psychology, 112*, 558-577.

Compas, B. E., Connor-Smith, J. K., Saltzman, H., Harding Thomsen, A., & Wadsworth, M. E. (2001). Coping with stress during childhood and adolescence: Problems, progress, and potential in theory and research. *Psychological Bulletin, 127,* 87–127.

Cresswell, S. L., & Eklund, R. C. (2005). Changes in athlete burnout and motivation over a 12-week league tournament. *Medicine and Science in Sports and Exercise, 37*, 1957-1966.

DeFreese, J. D., & Smith, A. L. (2014). Athlete social support, negative social interactions, and psychological health across a competitive sport season. *Journal of Sport & Exercise Psychology*, *36*, 619-630.

Graham, J. W., Cumsille, P. E., & Elek-Fisk, E. (2003). Methods for handling missing data. In J. A. Schinka & W. F. Velicer (Eds.), *Handbook of psychology: Research methods in psychology* (Vol. 2, pp. 87-114). New York: Wiley.

Gerber, M., Feldmeth, A. K., Lang, C., Brand, S., Elliot, C., Holsboer-Trachsler, E., & Pühse, U. (2015). The relationship between mental toughness, stress, and burnout among adolescents: A longitudinal study with Swiss vocational students. *Psychological Reports, 117*, 703-723.

Goodger, K., Gorely, T., Lavallee, D., & Harwood, C. (2007). Burnout in sport: A systematic review. *The Sport Psychologist*, *21*, 127-151.

Gucciardi, D. F. (2017). Mental toughness: Progress and prospects. *Current Opinion in Psychology, 16,* 17-23.

Gucciardi, D. F., & Gordon, S. (2009). Development and preliminary validation of the Cricket Mental Toughness Inventory (CMTI). *Journal of Sports Sciences, 27*, 1293-1310.

Gucciardi, D. F., Hanton, S., Gordon, S., Mallett, C. J., & Temby, P. (2015). The concept of mental toughness: Tests of dimensionality, nomological network and traitness. *Journal of Personality, 83*, 26-44.

Gustafsson, H., DeFreese, J. D., & Madigan, D. J. (2017). Athlete burnout: Review and recommendations. *Current Opinion in Psychology, 16*, 109-113.

Gustafsson, H., Madigan, D. J., & Lundkvist, E. (in press). Burnout in athletes. In R. Fuchs & M. Gerber (Eds.), *Handbuch Stressregulation und Sport.* Berlin: Springer.

Halson, S. L. (2014). Monitoring training load to understand fatigue in athletes. *Sports Medicine, 44*, 139-147.

Hill, A. P., Hall, H. K., & Appleton, P. R. (2010). Perfectionism and athlete burnout in junior elite athletes: The mediating influence of coping tendencies. *Anxiety, Stress, & Coping, 23*, 415-430.

Kaiseler, M., Polman, R., & Nicholls, A. (2009). Mental toughness, stress, stress appraisal, coping and coping effectiveness in sport. *Personality and Individual Differences, 47*, 728-733.

Levy, A., Nicholls, A., R., & Polman, R. C. J. (2012). Cognitive appraisals in sport: The direct and moderating role of mental toughness. *International Journal of Applied Psychology, 2*, 71-76. doi: 10.5923/j.ijap.20120204.05

Madigan, D. J., Stoeber, J., & Passfield, L. (2015). Perfectionism and burnout in junior athletes: A three-month longitudinal study. *Journal of Sport & Exercise Psychology, 37*, 305-315.

Madigan, D. J., Stoeber, J., & Passfield, L. (2016). Motivation mediates the perfectionism–burnout relationship: A three-wave longitudinal study with junior athletes. *Journal of Sport & Exercise Psychology, 28*, 341-354.

Mahoney, J. W., Ntoumanis, N., Gucciardi, D. F., Mallett, C. J., & Stebbings, J. (2016). Implementing an autonomy-supportive intervention to develop mental toughness in

adolescent rowers. *Journal of Applied Sport Psychology, 28,* 199-215.

Meeusen, R., Duclos, M., Foster, C., Fry, A., Gleeson, M., Nieman, D., ... & Urhausen, A. (2013). Prevention, diagnosis and treatment of the overtraining syndrome: Joint consensus statement of the European College of Sport Science (ECSS) and the American College of Sports Medicine (ACSM). *European Journal of Sport Science, 13,* 1-24.

Nicholls, A. R., Jones, C. R., Polman, R. C. J., & Borkoles, E. (2009). Acute sport-related stressors, coping, and emotion among professional rugby union players during training and matches. *Scandinavian Journal of Medicine & Science in Sports, 19,* 113-120.

Nicholls, A. R., Polman, R. C., Levy, A. R., & Backhouse, S. H. (2008). Mental toughness, optimism, pessimism, and coping among athletes. *Personality and Individual Differences, 44*, 1182-1192.

Raedeke, T. D., & Smith, A. L. (2001). Development and preliminary validation of an athlete burnout measure. *Journal of Sport & Exercise Psychology, 23*, 281-306.

Raedeke, T. D., & Smith, A. L. (2004). Coping resources and athlete burnout: An examination of stress mediated and moderation hypotheses. *Journal of Sport & Exercise Psychology, 26*, 525-541.

Salmela-Aro, K., Kiuru, N., Leskinen, E., & Nurmi, J. E. (2009). School Burnout Inventory (SBI): Reliability and validity. *European Journal of Psychological Assessment, 25*, 48–57.

Smith, R. E. (1986). Toward a cognitive-affective model of athletic burnout. *Journal of Sport Psychology, 8,* 36-50.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston, MA: Pearson.

Tibbert, S. J., Andersen, M. B., & Morris, T. (2015). What a difference a “Mentally Toughening” year makes: The acculturation of a rookie. *Psychology of Sport and Exercise, 17,* 68-78.

Table 1. *Descriptive Statistics, Cronbach's Alphas, and Bivariate Correlations*

Variable	1	2	3	4	5	6	7	8	9
Time 1									
1. Mental toughness									
2. Total burnout	–.43***								
3. Reduced sense of accomplishment	–.37***	.84***							
4. Exhaustion	–.30**	.84***	.55***						
5. Devaluation	–.41***	.84***	.59***	.51***					
Time 2									
6. Total burnout	–.55***	.79***	.71***	.59***	.70***				
7. Reduced sense of accomplishment	–.56***	.68***	.76***	.44***	.54***	.86***			
8. Exhaustion	–.37***	.65***	.50***	.66***	.46***	.84***	.55***		
9. Devaluation	–.50***	.73***	.59***	.45***	.80***	.91***	.71***	.64***	
M	5.24	2.26	2.37	2.41	2.01	2.15	2.23	2.21	2.02
SD	0.80	0.63	0.68	0.81	0.76	0.56	0.63	0.63	0.68
Cronbach's alpha	.87	.79	.76	.83	.82	.84	.75	.82	.80

Note. $N = 100$ for Time 1. $N = 93$ for Time 2. Time 2 = three months after Time 1.

**$p < .01$. ***$p < .001$.

Table 2. *Summary of Regression Analyses Predicting Athlete Burnout at Time 2.*

	Total burnout Time 2		Reduced sense of accomplishment Time 2		Exhaustion Time 2		Devaluation Time 2	
Predictors at Time 1	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step 1	.623***		.582***		.437***		.632***	
DV		.79***		.76***		.66***		.80***
Step 2	.045**		.078***		.025*		.034**	
DV		.68***		.64***		.60***		.71***
Mental Toughness		–.24**		–.31***		–.17*		–.20**
Total Variance	.668***		.660***		.462***		.666***	

Note. $N = 93$. Time 2 = three months after Time 1. DV = dependent variable at Time 1.

*$p < .05$. **$p < .01$. ***$p < .001$.